Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Mathematics III (Probability and Statistics) **Semester: III**
Program: B.Tech EE **Time : 03 hrs.**
Course Code: MATH 2046 **Max. Marks: 100**

Instructions: Attempt all questions

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	A bag contains 3 red and 4 white balls. Two draws are made without replacement. What is the probability that both the balls drawn are red.	**4**	**CO1**
Q2	If 10% of screws produced by a machine are defective, find the probability that out of 5 screws chosen at random none is defective.	**4**	**CO3**
Q3	The probability that a contractor will get a plumbing contract is $\frac{2}{3}$ and probability that he will get electric contract is $\frac{5}{9}$. If the probability of getting any one contract is $\frac{4}{5}$, what is the probability that he will get both the contract.	**4**	**CO1**
Q4	The equations of two regression lines, obtained in a correlation analysis of 60 observations are: $5x = 6y + 24$ and $1000y = 768x - 3608$. What is the correlation coefficient?	**4**	**CO4**
Q5	Find the relation between coefficient of correlation and coefficients of regression.	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)

Q 6	If the random variable has the probability density function $f(x)$ as $$f(x) = \begin{cases} 2e^{-2x} & x > 0 \\ 0 & x \leq 0 \end{cases}$$ Find the probabilities that it will take on values **i.** Between 1 and 3 **ii.** Greater than 0.5	**`10**	**CO3**
Q7	In a partially destroyed laboratory record of an analysis of a correlation data, the following results only are eligible: Variance of $x = 9$ Regression equations: $8x - 10y + 66 = 0, 40x - 18y = 214$. What were (a) the mean values of x and y	**10**	**CO4**

	(b) the standard deviation of y and the co-efficient of correlation between x and y.		
Q8	By the method of least squares, find the curve $y = ax + bx^2$ that best fits the following data: | x | 1 | 2 | 3 | 4 | 5 | | y | 1.8 | 5.1 | 8.9 | 14.1 | 19.8 |	**10**	**CO4**
Q9	Calculate the first four moments, skewness and kurtosis of the following distribution | x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | f | 1 | 8 | 28 | 56 | 70 | 56 | 28 | 8 | 1 | **OR** The first four moments of distribution about $x = 2$ are $1, 2.5, 5.5$ and 16. Calculate first four moments about mean	**10**	**CO2**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	**a.** The troubleshooting capacity of an IC chip in a circuit is a random variable X whose distribution function is given by $$F(x) = \begin{cases} 0 & x \leq 3 \\ 1 - \frac{9}{x^2} & x > 3 \end{cases}$$ Where x denotes the number of years. Find the probability that the IC chip will work properly **i**. Less than 8 years **ii**. Beyond 8 years **b.** Given is the joint distribution of X and Y X | Y | 0 | 1 | 2 | | 0 | .02 | .08 | .1 | | 1 | .05 | .2 | .25 | | 2 | .03 | .12 | .15 | Calculate marginal distribution and the conditional distribution of X and Y.	**20**	**CO2**

Q11	Records taken of the number of male and female births in 800 families having four children are as follows Number of male births: 0, 1, 2, 3, 4 Number of female births: 4, 3, 2, 1, 0 Number of families: 32, 178, 290, 236, 94 Test whether the data are consistent with the hypothesis that the Binomial law holds and the chance of male birth is equal to that of female birth, namely $p = q = 1/2$. Value of χ^2 at 5% level of significance for 4 is 9.49. **OR** Ten students got the following percentage of marks in mathematics and physics Mathematics(x): 8, 36, 98, 25, 75, 82, 92, 62, 65, 35 Physics (y): 84, 51, 91, 60, 68, 62, 86, 58, 35, 49 Find the rank correlation coefficient.	**20**	**CO4**